

PRESSURE TESTING REQUIREMENTS FOR HAZARDOUS LIQUID PIPELINES

California State Fire Marshal

CAL FIRE

Pipeline Safety Division


Bakersfield , CA

May 30, 2007

CFR Part 195 – Subpart E – Pressure Testing

California Regulations Sections
51013.5 thru 51014.5

Minimum Requirements for pressure testing of steel pipelines

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Part 195.302

General Requirements

No Operator may operate a pipeline unless it has been pressure tested and no operator may return to service a pipeline that has been replaced, relocated or changed until it has been pressure tested

195.303 RISK BASED ALTERNATIVES TO PRESSURE TESTING

- (a) An operator may elect to follow a program for testing a pipeline on a risked-based criteria as an alternative to pressure testing in 195.302(b)(1)(i)-(iii) and 195.302(b)(2)(i) of this subpart.

Guidance in Appendix B

&Part 195.304

Test Pressure

- 4 Continuous hours (Pre-tested or repair segment) Above ground testing
- 125%, or more, of the maximum operating pressure
- If line cannot be visually inspected, test for an additional 4 hours at pressure equal to 110%, or more, of the maximum operating pressure
- I.M.P. may require 8 hours

Part 195.305

Testing of Components

- Each pressure test must test all pipe and attached fittings, including components, unless
- Component, other than pipe, is only item being replaced and manufacturer certifies component was hydrostatically tested at factory or component was manufactured under quality control system to a prototype

Part 195.306

Test Medium

- Water must be used as test medium
- Exceptions: Liquid petroleum that does not vaporize rapidly, Carbon dioxide or air or inert gas may be used

Liquid petroleum

- May be used if it does not vaporize rapidly and
- Entire line is outside cities and other populated areas
- Each building within 300' is unoccupied
- Test section is kept under surveillance
- Continuous communication is maintained

Carbon Dioxide

- Carbon dioxide pipelines may use carbon dioxide if :
 - Entire line is outside cities or populated areas
 - Buildings within 300' are unoccupied
 - Continuous communication is maintained

Air or Inert gas

- May be used as test medium in low stress pipelines

Part 195.307

Pressure Testing Aboveground Breakout Tanks

- Tested in accordance with
 - API Specification 12F
 - API Standard 620
 - API Standard 650
 - API Standard 653
 - 2510 ASME Boiler/Pressure Vessel Code
 - Date specific requirements

Part 195.308

Testing of Tie-ins

- Pipe associated with tie-ins must be tested, either with the section to be tied in or separately

Part 195.310

Records

- Record of each pressure test that is required must be made and the record of the latest test must be retained as long as the facility tested is in use

Records Required

- Pressure recording charts
- Test instrument calibration data
- Name of operator, name of person responsible for making the test and name of test company used
- Date and time of test
- Minimum test pressure

Records Required (continued)

- The test medium
- Description of the facility tested and the test apparatus
- Explanation of any pressure discontinuities, test failures, etc
- Profile of the pipeline where elevation differences exceed 100'

Chapter 5.5
of the
California Government Code
MINIMUM STATE REQUIREMENTS

Sections 51013.5 thru
51014.5

51013.5

Testing; High Risk Pipelines; Testing Frequency

- Every new pipeline, existing pipeline or part of a pipeline system that has been replaced or relocated, and every pipeline that transports a hazardous liquid substance or HVL shall be tested in accordance with Subpart E of CFR Part 195

51013.5 (Continued)

- Every pipeline over 10 years old and not provided with with effective cathodic protection shall be tested every three years (high risk line tested annually)
- Every pipeline over 10 years old and provided with cathodic protection shall be tested every five years (high risk lines tested every two years)

Definitions

- A leak which is traceable to an external force, but for which corrosion is partly responsible, shall be deemed caused by corrosion
- “Defect” refers to manufacturing or construction defects
- “Leak” means a rupture required to be reported pursuant to Section 51018

State Fire Marshal may require any pipeline subject to this Chapter to be subjected to a pressure test, or any other test or inspection, at any time, in the interest of public safety

Other Test Methods

- Instrumented internal inspection devices (Smart Pigs) may be used if:
 - On an individual basis
 - Approval in writing
 - Alternative test may be done more frequently
 - Test intervals must continue

51014

Pressure tests Manner of Conducting

- Test conducted according to Part 195, except additional 4 hours not required for existing lines completely visible
- SFM may authorize use of liquid petroleum with a flashpoint of 140° F or 60 C. or more as test medium
- Test pressure shall be at least 125% of actual operating pressure (4 hour test)

Tests with Liquid Greater than 140° F, 60 C. Flashpoint

- Must be approved by the SFM
- Request must be in writing
- Must contain API or Specific Gravity and flashpoint of test medium
- Necessity to use a product instead of water
- Proposed product to be used
- Test pressure
- *Request should be made by operator 6 weeks prior to testing to provide adequate response time.

Other Test Medium (Continued)

- Pressure test procedures which address communication along route, personnel stationed at sensitive areas, procedures to be used in the event of a leak, notification of local fire departments
- SFM personnel may/will observe each test

51014.3

Notification Prior to Testing

- Operator shall notify SFM and local Fire Department at least three days prior to conducting test
- Notification shall include the following:
 - Name, address, telephone number of operator
 - Location of pipeline to be tested and location of test equipment

51014.3

(Continued)

- Date and time of test
- Invitation and phone number to fire department to call for further information or mitigative actions to take in the event of a leak
- Test medium
- Name, telephone number of independent testing firm or person responsible for the certification of results

51014.3

(Continued)

- State Fire Marshal may observe tests conducted

51014.5

Certification of Test

- Test results certified by independent testing firm
- Results submitted to CSFM by independent testing firm within 30 days
- Report shall show –
 - Date of test
 - Description of pipeline tested
 - Results of test

51014.5

(Continued)

- Any other test information
- State Fire Marshal shall not supervise, control or direct the testing
- (Any piece of paper that is submitted should have the CSFM Test ID# on it – in case papers get separated from each other we can match them up)

Date of Test

- Pipelines to be tested within 90 days after anniversary date of last hydro-test (present)
- Note Integrity Management Program will affect testing dates.(future)
- Waivers must be done in writing
- Each request is reviewed on an individual basis

Notification of Test to the CSFM

- Responsibility of Pipeline Operator to notify the CSFM at least three days prior to test
- Each test is given a test ID number which must be included with the results

Notification of Local Fire Department

- Responsibility of pipeline operator to notify the local fire department at least three days prior to test

Method of Testing

- Pressure tests shall not show an hourly change of each pipeline segment in excess of either 10 gallons or the sum of one gallon and an amount computed at a rate in gallons per mile equivalent to one-tenth of the nominal ID of the pipe in inches
- $1 + [\text{ID (inches)} / 10 \times \text{L (ft)} / 5280 \text{ (ft)}]$

Hourly Change

- Amount of fluid that cannot be accounted for by direct measurement or through temperature/pressure/volume calculations. After accounting for fluid measurements and temperature change, the amount of unaccounted fluid loss is limited to the previous formula.
- $1 + [\text{ID}(\text{inches})/10 \times \text{L}(\text{ft.})/5280(\text{ft.})]$

Measurement of Pressure

- Deadweight tester capable of measuring to 1 psi increments.
- Deadweight tester shall be calibrated once every two years
- Pressure readings shall be taken at a minimum of one hour increments
- Pressure chart recorder for continuous pressure recording calibrated prior to test

Pressure (Continued)

- Pressure gauge shall be provided at each end of the test segment to indicate entire test segment is pressurized
- Gauge should be calibrated prior to test

Measurement of Temperature

- Measuring device shall be placed so as to provide sample of pipe wall temperature
- Measuring devices for temperature should be placed in a manner to prevent dynamic variables on pipeline.(Pothole and bury)

Responsibilities of Testing Company

- Determine extent of test
- Account for any fluid added or drained from line
- Observe and document test pressure for required period
- Provide sketch or drawing of pipeline segment, appurtenances, valves, etc.
- Witness shall be qualified

(continued)

- Any testing inconsistencies must be brought to attention of CSFM
- Independent testing firm shall not witness or certify a test conducted on a pipeline on which they have previously performed new construction or repair work
- It is pipeline operators responsibility to verify and certify the test results

Pre-Tested Pipe

- Piping which has been hydrostatically tested prior to installation
- Shall be witnessed by certified testing company for a minimum of 4 hours
- Following information shall be marked on outside of pipe
 - CSFM Test ID Number
 - Date of Test and Test pressure
 - Marked every 5 feet (Stenciled)

WISH LIST FROM A TESTING FIRM

- Courtesy of Akri Hydrotest, Bakersfield
- Use a pig and/or high point vents to eliminate air inside pipeline
- Provide pressure gauge connections at all ends of the pipeline, so testing firm can verify that the entire test section is under test pressure
- Provide detailed directions to test site

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- Provide cell phone number of the on-site supervisor
- Have pipeline physical characteristics data readily available at the test site
- Give testing firm pipeline routing and profile drawings when they arrive on site
- Plan to use more than one temperature recorder on a buried line to allow averaging

(Continued)

- If pipeline is buried, predetermine locations to install temperature recorders that will yield representative temperature readings. Install recorders in bell holes away from exposed sections of the pipeline.
- Be sure pipeline representative is available at the conclusion of the test to sign the test record.

CSFM PIPELINE SAFETY

THANK YOU FOR YOUR
PARTICIPATION

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